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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

BRANCH OF RESEARCH

MONTHLY REPORT

OF

FOREST EXPERIMENT STATIONS
FOREST PRODUCTS
FOREST ECONOMICS
RANGE RESEARCH

MAR - 1928

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BRANCH OF RESEARCH

March, 1928

CONTENTS

	Page
Foreword	1
Why Not Adopt the Metric System Now?, By Joseph Kittredge, Jr.	3
Seed Dissemination Study Proposed, By H. W. Siggins	4
Forest Experiment Stations:	
Washington Office	5
Northeastern	6
Central States	8
Lake States	9
Appalachian	10
Allegheny	12
Southern	16
California	19
Pacific Northwest	24
Northern Rocky Mountain	26
Southwestern	28
Rocky Mountain	29
Manuscripts	30
Forest Products:	
District 1	34
District 6	36
Forest Economics - Washington	40
Forest Taxation Inquiry	45
Range Research:	
Washington Office	46
District 3	49
District 6	50
Great Basin	53
Jornada	55
Santa Rita	56
Research Editor	59

FOREWORD

SUGGESTED PROCEDURE FOR DETERMINING CORD; CUBIC FOOT CONVERTING FACTORS

By: Donald Bruce, Silviculturist

Field Data

For each tree, a completed record on Form 558-a. Care should be taken to include a notation of the point of utilization in the top. A notation should also be made of the pile into which the tree went.

For each pile, a record of the contents in cords, and of the trees which went into it.

N.B. If possible it should be arranged that no tree is divided between two or more piles. This means, of course, that piles should be of standard height but of random length. Piling and splitting should be in accord with the normal practice of the region; both should be carefully described in the general field notes.

Office Computation

For each tree, the volume in cubic feet of the merchantable portion, i.e., that which went into the piles.

For each pile, a summary of the number of cubic feet for each DBH class that went into it. There should be perhaps 6-8 DBH classes, say 2, 3, or 4 inches in extent. This summary would look something like this:

Pile No.	Vol. cords	Volume in cubic feet			
		3-6" DBH	7-10" DBH	11-14" DBH	etc
1	1.36	27.3	33.4	67.2	etc.
2	1.63	13.8	65.4	37.2	etc.

(Over)

For all the data, the calculation of a multiple regression equation of the following form, by the usual product moments methods:

$$V = f_1 v_1 + f_2 v_2 + f_3 v_3 + f_4 v_4 + \ldots\ldots\ldots$$

where V is the volume of the pile in cords,

v_1 , v_2 , v_3 , etc., are the volumes going into the pile in cubic feet or the successive DBH classes.

and f_1, f_2, f_3, are the converting factors for these DBH classes.

A modification of this procedure would be necessary if the only available data are from trees from which tie cuts are removed. The field data would be identical, but the office work would be directed to obtaining converting factors for each stick diameter class instead of for each DBH class. Such factors would be more awkward to apply, although not at all unusable. It would apparently be necessary in making the cordwood volume tables to use these factors to calculate the volume in cords of each tree, and then work up the volume table in the usual way instead of converting the cubic foot table directly into cords.

The number of piles which should be measured is uncertain.

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WHY NOT ADOPT THE METRIC SYSTEM NOW?

By

Joseph Kittredge, Jr.,
Lake States Station.

The advantages in the adoption of the metric system in American forestry were ably discussed in an article, "American Forestry and the Metric System," by P. C. Wakeley in the Journal of Forestry of December, 1927. It may be admitted that there are objections to its adoption by the domestic lumber industry and possibly also by foresters insofar as they are working with board foot measure. These objections are not valid, however, for those foresters, at the present time chiefly engaged in investigative work, who are calculating volume, growth, and yield in cubic feet. We still have only a limited amount of data in cubic feet in the United States, and the use of the cubic foot except in investigative work is negligible. But such figures are rapidly accumulating. The time is, therefore, particularly opportune to make the change to the metric system at least for experimental work and for all measurements which involve cubic volume. Until the metric system is generally adopted, conversions can be made from cubic meters to board feet or cords for the benefit of practical woodsmen as readily as they are now from cubic feet to those units.

The lines of development of forest research are tending to converge with those of the botanical and other sciences which already use the metric system. By its adoption, we make our data more acceptable to other scientists, and we facilitate comparisons with their data both directly and by accustoming ourselves to the metric units. Moreover, American investigators will gain in the greater ease of computation and of comparisons with foreign forestry figures which are expressed almost exclusively in metric units.

The transition from the American to the metric system for woods work is not difficult to make. If I may cite my own experience, it required only a few weeks practice, working with foresters who used the metric units, to be able to estimate diameters in centimeters, heights in meters, and volumes in cubic meters or steres (stacked cubic meters), as readily as I had previously been able to estimate in inches, feet, board feet, and cords.

Has the adoption of the metric system been given the consideration it deserves? Is the desirability of its adoption in this country recognized by those engaged in forest research, and if so, who should take the lead in making the change? Four out of six of the members of the Lake States Station favor changing to metric units immediately in all permanent sample plot or other work which now involves cubic foot units. It seems likely that a large majority of the forest experiment station members throughout the country would likewise favor the change. It should by all means be made before the expansion of forest experiment stations accelerates the accumulation of data. If an expression of opinion for or against the adoption of the metric system is necessary, it is suggested that the canvass be made forthwith. If not, why should the necessary steps not be taken to adopt the metric units in all forest experiment station work with the least possible delay?

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SEED DISSEMINATION STUDY PROPOSED

By H. W. Siggins

It would be a matter of general value and interest to all the experiment stations if the rate of fall and distance of dissemination for all American tree seeds which are disseminated by wind could be determined. The matter was discussed with Isaac while he was in Berkeley and it was agreed that the California station is best equipped to determine rate of fall in quiet air, while the Pacific Northwest Station is in the best position to carry out field tests.

The tests for all species ought to be conducted under identical conditions in order to get a reliable comparison. It is therefore suggested that this study be made a major project for the winter of 1928-29. If this is done arrangements should be made at an early date for collection of samples of all species from the 1928 seed crop.

The specific gravity of the seeds is a factor of primary importance in this study. Since specific gravity varies with changes in mositure content, the results will be obtained by having all coniferous seeds shipped to the California station in the unopened cones as soon as they are gathered. They should be well wrapped to guard against opening in transit. Naked seeds should be collected into air tight receptacles and shipped to us without delay. Upon arrival here the seeds and cones should be placed in the University of California regrigerator where they will keep in proper condition until we are ready to use them. Ample cold storage space is available.

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FOREST EXPERIMENT STATIONS

Washington

General

Munns made a visit during March to assist Boyce in getting squared away upon his new duties as director of the Northeastern Forest Experiment Station and to consider with him a number of questions relating to organization. In returning, he stopped at the Allegheny Station, visiting Forbes.

Schnur returned to the Allegheny Station, and Day to the Central States. Barrett left for a short visit to his home in Ohio, planning to return to Washington for a short time about the middle of April. Buell remains in Washington to complete some machine tabulation work.

Pearson has been assisting in the office on manuscripts and on going over with the Editor his manuscript on forest types. After he has been over this with the Editor he will then be ready to return to the Southwest. In so doing, he plans to visit the Appalachian and the Southern Stations, and probably will also make a short visit to the Northeastern Station and to several New England points.

Congress

Senator McNary reintroduced his bill for forest research in the Senate and reported the measure out of the Agricultural Committee with one amendment, this being in conformity with certain suggestions made by the Department of Agriculture. McSweeney has reintroduced his bill containing amendments agreed upon, and it is expected that at an early date the Agricultural Committee will report out the new bill with its endorsement.

Personnel

The Section of Forest Measurements will lose Miss Alexander the middle of the month by her transfer to the Office of Accounts. Similarly, also, Hartell finishes his detail to Washington in mid-April and leaves for District 3. Hartell plans on working a short time with Pearson in the Southwest before taking on active duties in the District organization.

Behre plans to resign from the Northeastern station about the middle of April.

The junior forester examination held this spring resulted in some 154 boys taking the examination, of which approximately one-third passed. Of this number, about 8 men have been recommended to Research by the schools.

Library

Last month, the library loaned 933 books and periodicals, and 166 members of the Service and others consulted the library in person.

There were 309 books and periodical articles indexed for the catalogue during the month.

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NORTHEASTERN FOREST EXPERIMENT STATION

Boyce arrived at Amherst on March 16, and was greeted with boquets of flowers in the office. The brickbats will follow later. Enroute from Portland several stops were made. At St. Paul the usual discussions resulted with Zon, particularly on what is fundamental research (don't all answer at once) and on selective logging. At Madison the possibility of correlating permanent sample plot studies with the relation of rate of growth to quality of wood was taken up with Paul and Koehler, and Garver sketched in a general way the method of studying selective logging. While at Ann Arbor high lights of the new job were given him by Dana, and talks were made to the forest club and to the class in forest management. The remainder of the month was spent in getting a general idea of the station program and in going over policies and work with Munns, who visited the station for a week.

Behre has about completed the statistical analysis of his form study data, and is ready to bring the results together for a final report. The detailed analysis of factors affecting both thickness and butt swell at breast height substantiates the preliminary assumption upon which the application of form class volume tables has been based; namely, that insofar as they can be accounted for at all, bark thickness and butt swell are primarily functions of the diameter of the tree. However, age taken in conjunction with diameter greatly improves the accuracy with which the total effect of bark thickness and butt swell can be estimated.

Gast spent the month in computing and drawing graphs for the paper on the thermopile for measurement of radiation in silvical studies. He has also been working up three short papers on (1) the description of the thermopile; (2) the relation between relative humidity and radiation; and (3) the results of the experiment to determine the effect of screens on the rate of drying out of duff, the latter being one of the over-lapping studies of the fire weather and silvical projects.

MacAloney has been working on his white pine weevil manuscript, which should be ready for the editor by next fall, and has spent some time in preparation for the field season, as weather conditions indicate that the resumption of activity of forest insects will be early this season. The final check on the life history of the white pine weevil will be made this spring.

In addition to the routine work of the office, Spaulding reports that pure cultures of the larch canker fungus have been made, and the fungus is being studied in its growth upon twigs of various species of conifers.

Stickel spent the greater part of the month in preparing for the opening of the fire weather stations at Cranberry Lake in the Adirondacks and at the Harvard Forest at Petersham, Mass. He plans to carry on investigations at Cranberry Lake, assisted by Irving H. Taylor, Cornell '27, who has been at the Lake States Station since October, 1927, and will open up the station about April 1, while Gottlieb will start the work at Harvard Forest at the same time.

Mr. Koroleff, logging engineer for the Woodlands Section of the Canadian Pulp and Paper Association, was a caller at the office the fore part of the month. The lumber industry in Canada is faced with the same problems that are perplexing it in the Northeast, the utilization of hardwoods in mixture with spruce and fir being one of the most difficult. One of Koroleff's major projects is the solution of this problem, the key to the situation, of course, being transportation. Koroleff's attention was called to one operation near Harmony, Maine, where hardwood pulpwood is being successfully driven for a distance of from eight to ten miles, and then shipped by rail to the pulp mill.

During the winter occasional meeting of the entire personnel of the station have been held for the purpose of acquainting each member of the organization more fully with the work of the station as a whole. Even in such comparatively small organizations as the forest experiment stations there is danger of the members becoming so

absorbed in their own individual problems as to overlook opportunities for joining forces most effectively in what often proves to be a common problem. At the last meeting, Dr. Spaulding explained the work being undertaken by him in tree diseases and slash deterioration studies, and their intimate connection with the silvicultural, entomological, and growth studies. The meeting was also attended by several members of the staff of the Botany department of the College.

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CENTRAL STATES FOREST EXPERIMENT STATION

General

In connection with the preparation of the Station's program McCarthy and Kellogg visited Wooster for a conference with State Forester Secrest. Two projects are being carried on by the Ohio State Service which may be of interest in the current program of this Station. One, a study of grazing, is being conducted by Leffelman and the second, a study of plantations in the State of Ohio, is being conducted by Paton. The latter study is nearing completion while the study of grazing in relation to the woodlot was begun the past year.

On a recent visit to Cincinnati, McCarthy spoke before the Blue Hydra Society, an organization of the Botany Department of the University of Cincinnati. He explained to this organization the character of work being carried on by the forest experiment station and illustrated the lecture by the use of slides.

At the request of the Dean of the Agricultural College, this Station cooperated with the Professor of Forestry, Norman W. Scherer, in arranging a course of study to cover the first two years of a professional forestry course at the Ohio State University. After considerable correspondence with leading forestry institutions, an agreement has been reached on a satisfactory program for the first two years. It is expected that this will be adopted by the Ohio State University, thereby securing students credit on the first two years of a forestry course at this institution and also allowing the development of forestry courses suitable for students in agricultural courses.

Arrangements were made with the Botany Department to do a small amount of planting in preparation for the establishment of an arboretum under the supervision of the Botany Department of the Ohio State University. The Station already has seeds of about forty species to use for this purpose.

The major work accomplished at the Station during the month consisted of the partial tabulation of data contained on the 284 plots measured since the beginning of work on this project. This tabulation was done in conformity with the instructions from the Section of Computation in Washington looking to the use of punch cards for sorting and compiling.

Some of the earlier measurements made in the oak yield study did not have sufficiently complete height-diameter measurements to allow the preparation of height-diameter curves for each of the plots. This necessitated a study of the variation of height on diameter as influenced by crown class, age, site, and height of the dominant stand. As a result of this study a set of height diameter curves has been prepared. These are referenced to the height of the dominant stand, irrespective of crown class and site.

At the end of the month, Day completed his detail to Washington for computation of volume tables for the oaks.

An attempt was made to locate an area where a study of cordwood could be made. Meyer and Hanley made one trip into the eastern part of the State to investigate an area where cordwood cutting was reported but it was found to be unsatisfactory for our use. They did, however, have an opportunity to visit an area of land upon which coal had been mined by the stripping method. This problem is of sufficient importance to warrant, later, a study of establishment of forest plantations upon this type of land.

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LAKE STATES FOREST EXPERIMENT STATION

The shaping up of the investigative program for the year is the only outstanding completed piece of work for this month.

Zon and Bates attended the Wisconsin Commercial Forestry Conference at Milwaukee, where Zon presented a paper on "Forest Conditions in Wisconsin." This conference is the first regional meeting following up the general conference in Chicago last November.

Kittredge is continuing the preparation of the report on the aspen study. Zon is writing an extensive article on forests and

forestry for the Encyclopedia Brittanica. Averell and Zon submitted a paper dealing with the problem of swamp drainage in forestry for presentation at the National Drainage Congress in Kansas City. Averell also read a paper on "The Choice of Swamp Land for Improved Forest Growth" before the seminar of the Soils Department of the University. The report on the Wagon Wheel Gap streamflow experiment, prepared jointly by Bates and Henry of the Weather Bureau, has gone to the printer. Howat completed a type map of the experimental tract at the Upper Peninsula field station, and is now working up volume data for sugar maple in an attempt to make a satisfactory volume table for local use at that station.

Personnel

The increased volume of routine work at the Station has necessitated the addition to the staff of another stenographer, Mrs. F. J. McGlenn. I. H. Taylor, temporary assistant here for the past six months, secured a position with the Northeastern Station and left for Amherst on March 14 to take up his new duties. J. L. Deen, who graduated from the University of Minnesota Forest School this spring, has been employed as temporary office and field assistant.

APPALACHIAN FOREST EXPERIMENT STATION

Reports and office work occupied the staff for most of the month. After completing the annual report and program for 1928, Frothingham spent all available time on the timber growing and logging practice report. Odds and ends on the spruce regeneration study were rounded up by Korstian and Scholz. Field Assistant Nothstein put the crown projection maps for the chestnut replacement permanent sample plots in shape for drafting. MacKinney spent the first half of the month consolidating and indexing the Station's permanent sample plot records.

Visitors during the month included Messrs. J. M. Miller and J. C. Evenden of the Division of Forest Insects, Bureau of Entomology, and Dr. Dufrenoy, Director of the Plant Pathology station at Brive, near Paris, France. Mr. Miller is in charge of the Palo Alto, California, field station and Mr. Evenden of the Coeur d'Alene, Idaho, station.

Planting

The last half of the month brought spring in all of her glory and the beginning of this year's nursery and planting work. An inventory and examination of the Bent Creek experimental seed beds brought out two striking facts:

1. The growth and development of seedlings was very markedly influenced by soil conditions.

2. Frost heaving of both seedlings and transplants was noticeable on all three sites under observation. The amount of heaving varied greatly with the species, all of the western white pine transplants, 10 to 20 per cent of the southern balsam fir seedlings, and none of the hardwood seedlings being heaved. It was also noted that mulching practically eliminates the heaving.

MacKinney and party put out eight plantations, including 3,000 one-year yellow poplar, 200 black walnut, 1,000 Scotch pine, and 200 2-1 Corsican pine seedlings. Yellow poplar was planted on a poplar site, pure and mixed with walnut, and on oak-chestnut lands, to determine the feasibility of extending the range of poplar on to such lands, following the disappearance of the blighted chestnut.

Storage of acorns

Acorns of white, scarlet, and chestnut oak stored last fall by three different methods were removed and planted - some in the nursery of the Champion Fibre Company, at Canton, N. C., and the remainder in the experimental forest at Bent Creek.

The white and chestnut oak acorns stored in running creek water germinated during the first two weeks in storage and were found to have lost their viability by spring. Since the scarlet oak acorns must pass through a rest period prior to germination, these acorns were viable when removed, but had germinated sufficiently to have tender roots about one-half inch long protruding from the acorn. These roots were very easily broken off in handling. The white and chestnut oak acorns stratified in sand and buried 3 feet under ground also germinated during the warm weather of last fall, and when removed from the storage pit the middle of March had roots 1 to 3 inches long and were also difficult to handle.

The acorns which had been overwintered in cold storage at about 40° to 45° F. apparently were in the best condition for planting. Where,

because of danger of rodent damage, acorns cannot be safely planted in the autumn soon after collecting, stratifying in sand in cold storage is the best method of overwintering.

Forest Insect Studies

Beal spent two weeks on a field trip into Georgia and Florida. Further observations on emergence and life history of the turpentine borer were made by Craighead, Wyman, and Beal. The southern pine beetle was found actively at work in eastern Georgia. A tract of some 25 acres of dead longleaf pine was visited and the damage found to be that of the southern pine beetle. Since this timber is located on an island off the mainland the matter of control should be fairly easy.

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ALLEGHENY FOREST EXPERIMENT STATION (February & March)

Dr. A. P. Kelley reported for duty as Associate Forest Ecologist on the first of February. Kelley graduated from the University of Pennsylvania in 1920, and took his Doctor's degree here in 1923. Since the latter date he has been instructor, and later assistant professor of botany, at Rutgers University. He has spent his vacations in various parts of the West, and during the last summer was the first man to be engaged by Thomas Edison in his survey of possible rubber-producing plants in the southeastern United States. Dr. Kelley comes to us with a splendid reputation as a man and as a botanist, and is very much at home in field work.

Considerable progress has been made in the formulation of the station program. The Allegheny Section of the Society of American Foresters devoted the greater part of one session at its winter meeting to a discussion of the station work. Very evidently the foresters of the Allegheny region are interested in our work. Professor J. A. Ferguson of Pennsylvania State College read a paper on forest research which gave a splendid background for the more detailed discussion which followed. State Forester Illick summarized the research work which has already been done in his State, and the meeting was then thrown open for general discussion. In addition to suggestions for silvical investigations, we received pressing invitations to investigate several economic problems, such as the markets for smaller sized forest products, and freight rates. Perhaps the most interesting problem reported as in need of investigation is the

damage caused by deer to both artificial and natural reproduction in certain sections of Pennsylvania. Locally, according to Illick, deer have become as numerous as one head to five acres, and the browsing of pitch pine, white oak, elm, and a variety of other species has reached very serious proportions. Unless the situation is remedied it may become necessary to suspend planting operations on certain of the state forests. The committee on information of the Section, which has been the medium for promoting interest in research, was on its own motion discharged, because it felt that with the establishment of the Federal experiment station its work was completed. This committee had issued a mimeographed statement of the research work under way in the Section's territory, and aimed to serve as a clearing-house for ideas in the investigative field. If this meeting is a true indication of the attitude of the foresters of the territory toward the station our "public relations" will be easy to keep from becoming "poor relations."

Following the Harrisburg meetings the staff held an informal conference and crystallized its ideas as to lines of work which we will recommend to the Branch for the coming field season.

Hough has been making a diligent study of the various proposals for classifying the forests of our region. He finds very little agreement between the foresters, to say nothing of the botanists and ecologists, but we hope in time to find some common ground which will enable the region in the future to speak the same language when referring to forest types. Dr. Kelley also has been spending much time in the botanical libraries of the University and city, on historical research. An understanding of the original forest conditions in our territory would seem to be an excellent guide to future silviculture, provided, of course, man and man-caused fires have not too greatly altered these conditions. He has supplemented his local reading by visits to the libraries at Harrisburg and New Brunswick.

Some apprehension which had been felt concerning the use of the headquarters tract at Camp Ockanickon was relieved by the final signing of an agreement with the county Y.M.C.A.'s late in March. There had never been any essential differences between us, but the scattered organization of the "Y" had made it somewhat difficult to obtain agreement on details. In the meantime, however, Wood had retraced some of the somewhat uncertain land lines, and now has a satisfactory map of them, the lakes, and the principal wood roads. This has enabled him to plan on fire lines which will make the tract even more secure than it now is; although it is by no means fireproof, its location with respect to roads and streams makes protection much surer than on most tracts in south Jersey. In connection

with the work at Camp Ockanickon nearly all members of the staff now have had some glimpses of the state forests of this section, and some conception of the varied and effective work being done on them.

By calling on the entire staff for help, Forbes was able to complete the revision of his pine growth manuscript. He also wrote a very much belated review of Cope's bulletin on loblolly pine in Maryland, and a brief reply to Professor K. W. Woodward's attack on the capacity of the southern "piney woods" to grow trees. He reviewed Korstian's white cedar manuscript, and read with much interest MacIntyre's report on scrub oak in Pennsylvania. MacIntyre had the help of two temporary men from the station all last summer; as was to be expected, he reached no new or startling conclusions, but laid the foundations for future work, in some phases of which we will cooperate.

Forbes gave talks on the work of the experiment station before the Pennsylvania Botanical Society, and the Graduate Botanical club, as well as a more general talk on forestry as a life work before a conference of older Y.M.C.A. boys at Moorestown, New Jersey. He also broadcast an account of forest research over the local station, WCAU, and has been invited to draw up a series of radio talks, in which several members of the staff will participate next winter. In attending the meeting of the woodlands section of the American Paper and Pulp Association, he was particularly struck by the elementary character of several of the papers presented. Forbes has been used to hearing this sort of thing in the South, where forestry is something new, but he had an idea that the sophisticated East had reached a somewhat higher stage in its forestry thought!

A four days' trip gave Forbes a profitable glimpse of the forest schools at Cornell and Syracuse. Neither of these universities is in a forest type very different from much of the Allegheny territory, and the new experimental forest at Cornell, and the nursery and plantations at Syracuse, held much of direct interest. His inquiries concerning promising men in the senior class at both institutions resulted in a conference with almost the whole faculty at Cornell. At Syracuse, on the other hand, the very size of the faculty and student body has made it necessary to concentrate matters of this kind in the hands of a single designated member of the faculty. At both institutions Forbes was met with extreme cordiality, and although they are both out of the Allegheny territory he looks forward to continued contact with them.

Among the visitors of the month were Mr. A. M. Henry, formerly of Florida, and one of the candidates for the state forester's position there; Mr. W. D. Tyler, chairman of the advisory council of the Appalachian Station; and, for a very crowded day, Mr. Munns.

Management

Hough completed the work begun by him and Forbes on the permanent plots on the Allegheny National Forest. In spite of bitter cold, interspersed with snow, he finished mapping the tree crowns on the two plots to be cut this spring, and in addition obtained measurements of heights and diameters, and photographs. The balance of the work on these plots will be done later in the spring when cutting has been completed, and the weather is more favorable to field work. He and Forbes reviewed the plan outlined by District 7 for following up the results of cutting on National Forest sales.

Measurements

Schnur continued his work on the oak volume tables in Washington, returning to Philadelphia on the last day of March. He reports an extremely profitable detail. He not only gained a great deal of specific information on mensuration and statistical methods, but profited from attendance at the inter-bureau forest research conferences, meetings of the Washington Section, etc.

Wood has been examining various batches of sample plot data sent us from Washington covering old work in our territory. The only worth-while data apparently are included in the records of loblolly pine in Maryland. The permanent yield plots in this series have been put in shape for volume computations, although as is generally the case, early data on heights are very inadequate.

Pathology

Kelley visited the forest nursery at Mont Alto and obtained specimens of mycorrhiza from a considerable variety of species. It is his opinion that mycorrhiza are extremely common in our territory, certainly in New Jersey, and an investigation of them appears well worth while. His investigations, which will consist of sectioning and microscopic examinations, and at least some work in cultures, is one approach to the problem of artificial forestation; that is, the presence or absence of mycorrhiza on nursery stock may be one key to the success of plantations.

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SOUTHERN FOREST EXPERIMENT STATION

General

Most of the men were in the field the better part of the month.

Demmon left by car on the 29th for Starke and on the way visited the Forest Service at Pensacola; spent an hour with Gemmer at Camp Pinchot; thence to Albany, Georgia, where he spent an afternoon with Fred Merrill, Assistant State Forester.

Mrs. A. G. Terburg's temporary appointment expired during the month. She was able before she left to put the library in first-class shape. This was a tremendous job and comprised six weeks' work on the part of two clerks, but was worth the money and time spent on it. W. W. Koch, who was temporarily employed as student assistant at our Starke, Florida, branch, left during the month.

Demmon, Wahlenberg, and Lentz attended the meetings of the Southern Pine Association, held in New Orleans. Wyman addressed about 25 naval stores operators at a meeting of the Central Florida Turpentine Producers' Association.

Each member of the staff contributed one or more articles for publication during American Forest Week.

Gemmer expanded his meteorological observations to include wind velocities, soil temperatures, and soil moisture determinations.

Wyman spent four and one-half days with Ashe of the Washington Office and Supervisor Shaw of the Florida National Forest, examining the holdings of several lumber companies for acquisition work. Wyman also went with Ashe to the Ocala to look over some holdings nearby.

Among the visitors at headquarters during the month were Dr. Hugh P. Baker, U. S. Chamber of Commerce; Dr. Joseph Hyde Pratt, President of Western North Carolina, Inc., Asheville; Dr. W. P. Taylor, U.S. Biological Survey, Tuscon, Arizona; Prof. R. R. Fenska, of Syracuse University. Visitors at the Starke Branch were: M. Jean Dufrenoy, a French pathologist, Alex Sessoms of Cogsdell, Ga., and Leslie Sanders, who worked temporarily at this Station. Doctors Cary and Gerry were at Starke the whole of the month, except for short trips away. Doctors Weinstein and Gerry of the Forest Products Laboratory, and Supervisor Shaw, visited Camp Pinchot; and Dr. Taylor visited the Bogalusa Branch.

Protection, Fire

Demmon and Barrett made a short trip to Hammond, La., to look over and make notes on the area burned in the fire of last January.

Management

Wahlenberg and Hills laid out four half-acre growth plots at McNeill. The work involved included tagging and measuring heights and diameters on about 1350 longleaf seedlings, saplings, and small poles. The plan is to remeasure the same trees after five years to show the effects of the four methods of land management on tree growth. A special extension rod was constructed for direct measurement of heights in feet and tenths of feet up to a height of about 35 feet. The rod increased both the accuracy and rapidity of the work. A Klausner hypsometer was used for the relatively few heights above 35 feet.

Barrett left for the Washington Office to discuss with Reinecke of the Office of Measurements the working plan for the series of thinning plots much more adequate than any laid out by this Station in the past.

Gemmer reports that ants are "raising hob" with the seed spots at Camp Pinchot, as they did last year. This indicates that these insects, until last year a totally unsuspected factor limiting the natural reproduction of longleaf, may operate regularly every season that there is any seed whatever produced.

Naval Stores

Two hundred trees were laid out in each of the two groups in the Duke test. One group will be chipped one inch deep, the other group will be a check group 1/2 x 1/2 inches, which will also be used for yield table material. At Union there were three groups in young longleaf. These were narrow faces (25 per cent) deep chipping (one inch deep), and the check groups (1/2 x 1/2 with one-third of the bark cut away). On these two tracts all field work was completed except the tree descriptions.

The regular streaks were placed on the Sampson and Kingsley tracts, and the first streak at Union and at Duke's. Regular work was carried on on the daily weighing trees and the records kept up-to-date. Fifty trees were faced with two faces, one French face about

five inches wide on one side and an American face of the same width on the other. At the same time 25 trees had split faces put on, the total of both sides of the split face amounting to one-third of the bark circumference.

Forestation

Wakeley, with the help of Student Assistant Hills and a laborer, treated beds in the Great Southern Lumber Company's nursery with various combinations of zinc sulphate, formalin, and paper towelling, to control weeds; white arsenic was used in addition for white grubs. Wakeley superintended the sowing of these beds with longleaf seed, and took notes on the practice in the Great Southern's nursery. This nursery is all in longleaf, drill sown six inches apart; the beds are five feet wide; covered with either burlap or loblolly pine needles. The germination is excellent, with little damping-off. The probable output of the nursery this year is 10 million seedlings or more.

Wakeley finished the five-year reexamination of loblolly spacing plantations, 5 x 5, 6 x 6, 6 x 8, and 8 x 8, one acre each, which look very well. Two trees (6 years from seed) in the 8 x 8 plantation are producing pollen, and many trees are eight and nine feet high despite tip moth. Reexaminations of 6,000 trees in the 1924-25 slash and longleaf plantations were made.

Three hundred longleaf seed spots were put in, half untreated and half treated with red lead to keep off rodents and birds.

Gemmer finished sowing Jeffrey pine seed in seed spots in the clearing and in the brush. He also deposited samples of seeds in cold storage at Niceville.

Recounts were made on seed spots in brush and trenched area and plowed field, and also of transplants in trenched area and brush. Recounts and maps were made of Plots C12 and G13.

Gemmer reports that recent rains have done quite a lot of damage to the seedlings in the nursery beds, one group being badly hit by damping-off.

Longleaf and loblolly pollen were collected for the Eddy Tree Breeding Station by both Wakeley and Wyman.

Protection, Others

Disease. Needle blight eradication plots were laid out in the 800-acre burn suffered by the Great Southern on March 21 in their best young longleaf.

Some microscope work was done on the fungus causing needle blight of longleaf. This fungus is forming perithecia.

Insects. Observations were made on the emergence and flight of tip moth.

J. A. Beal returned to Starke to make further observations on the emergence and life habits of the turpentine beetle. Emergence holes were counted on about 120 trees, and the peak of emergence seems to have occurred during the week of March 5 to 10. It was noticed that the borers after emerging flew into the tops of neighboring trees, and Dr. Craighead, Beal, and Wyman found evidence of their feeding on the foliage on the pine trees. Some work was done on old faces, and it was found that the borer attacks reached about eight to ten inches above the height of the face. Five adult borers were collected and placed in a cage at Kingsley Lake in order to insure a point of attack which can be followed up later.

Hardwood Investigations

Lentz and Putnam carried on in detail the hardwood studies on several lumber companies' operations in Louisiana. They were also able to check up on damage done by floods. Demmon went out with them for a brief period the middle of the month.

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CALIFORNIA FOREST EXPERIMENT STATION

General

The District Investigative Committee met from March 12 to 14. About thirty men, representing the administrative organization, State Forestry Service, the Eddy Tree Breeding Institute, the Forestry School, the Bureaus of Entomology, Pathology, Biological Survey, and Weather Bureau, together with the staff of the Station, participated in the discussion. Coordination of effort and simplifying programs of work were the keynotes of the session.

Kotok spent part of the month on the preparation of data for the manuscript on "Fires in the Last Decade in California," which is being handled with Show as co-author. Some work was also attempted in the

revision of Show's and Kotok's manuscript, "Cover Type and Forest Fires," which has met with severe criticism of the Board of Review.

Hill gave a talk at a nationwide conference of National Park superintendents on "Research in Relation to Forestry in the National Parks."

Ranger Tyler resigned as superintendent of the Station at Feather River. A temporary substitute has been placed in charge. Tyler's leaving has placed an extra burden on Siggins in carrying out contemplated nursery work at the substation.

Extension Forester Metcalf's study of windbreaks in southern California brings further evidence of the ameliorating influence of forest cover in this region. During December 17 and 18, San Bernardino County was visited by a northeast wind storm, which reached recorded velocities of 50 miles per hour at a station in the open, a station located 305 feet south of a 66-feet high blue gum windbreak, and another located 192 feet south of a 46-feet high blue gum windbreak recorded only maximum velocities for the same period of 15 miles per hour. During the entire course of the storm the stations in the lee of the breaks show consistently about one-third of the wind velocities of that attained by the station in the open.

Management

Tentative plans are being made for a thorough analitical study of cutting, logging, and milling for a typical operation in selection stands. The objects are to correlate costs of production, grades produced, and profits with tree classes and log grades in the field. Going studies of methods of cutting and logging will be coordinated with a Products mill scale study in such a way that the results can be referred to the same group of trees.

Clements and Garin are making good progress compiling the records for the methods of cutting and thinning studies.

Riley, detailed from the Modoc, has worked during the month assembling material from the methods of cutting records for use in management plans.

Two proposed working plans were reviewed with Mr. Woodbury of Forest Management. Preparation of these plans emphasizes the need for more growth data for use in predicting the second cut in selection stands.

Proposed revision of District marking rules, incorporating a new tree classification were gone over with Mr. Woodbury.

Southern California

At Devil Canyon Nursery the last of the surplus stock was distributed to our cooperators and transplanting was begun. The total shipment of stock amounted to 31,000, of which 28,000 were Coulter pine and the balance western yellow, sugar, Monterey, Canary Island, and Japanese pines. Transplanting to date included 38,000 Coulter pine and 15,000 big cone spruce. Smaller quantities of other species are still to be transplanted. Twenty seedbeds have been prepared and space is reserved for seven additional beds. Seed sown to date includes 25 species of conifers, 25 species of hardwoods and eucalypts, one palm, and 12 species of chaparral. Soil thermometers were installed in the seedbed area to obtain records for depths of 1, 3, 6, and 12 inches below the surface.

Forest Influences. No storms of run-off producing intensity occurred in the south during March, despite the heavy precipitation in northern California. Rain fell on eleven days but the total for the month was less than two inches. Rainfall at the Nursery for the season is:

October	3.60	inches
November	2.03	"
December	4.68	"
January	0.81	"
February	4.31	"
March	1.63	" (March 15; total figure for
	17.06	" month not yer received.)

At the Barranca area Weaver ran sectioning levels to determine the volume of the sediment deposit in the reservoir measured and removed the sediment from the weir basin, and gave the usual attention to the recording instruments and the meteorological station. In Berkeley Kraebel worked up some of the rainfall records and consulted the District Engineer regarding changes in the method of measuring the rate of runoff from the watershed. He also prepared a progress report for our cooperators, and an outline for a preliminary examination by Wieslander of the area flooded by the failure of the St. Francis dam in Los Angeles County. On the laboratory runoff plots at the University in which we are cooperating with Lowdermilk, the first tests with artificial rain were started, and in addition interesting results were obtained from the heavy rain of March 22 to 27.

Cover Type Study. Wieslander spent most of the month with the mapping crews on the Angeles Forest, rounding out certain areas to close the work for this season at the end of the month. The men contributed

by the Forest and the District Office will be recalled on April 1 to other duties. About a million acres of the Angeles National Forest and adjacent territory will have been mapped.

Entomology

Except for the time devoted to the preparation of a memorandum for the Investigative Committee and attendance at the meetings most of the time of both Person and Struble has been spent in further work on the two main projects, - biological control studies and the analysis of the tree selection sample plot data.

An analysis of the Brown's Well sample plot data shows a very definite selection of the slow growing trees regardless of diameter class, tree class or year of attack. The preference of the western pine beetle for certain tree classes (Dunning's) previously noted is evidently the result principally of difference in growth rate. If the tree classes 1 to 5 are arranged according to average growth rate they bear the same relation to each other as when arranged according to percentage loss from D. brevicomis, only reversed; that is, the slower the growth rate the greater the insect loss.

Products

White fir. Brundage spent the major portion of his time analyzing field data and preparing the final report on the white fir project. The mass of interviews, mill observations, comparative selling prices in various parts of the state, data on competing species and the whole heterogeneous array of more or less abstract information respecting regional supply, operating costs, silvicultural considerations, marketing and sundry other phases have proved to be more difficult to assemble and correlate than an intricate Chinese puzzle. The chief objective in all this work which has occupied part of the time of three successive Products assistants over a three year period is, of course, the drawing up of a general summary from which a set of recommendations may be derived looking toward a solution of the white fir problem. While the answers seem plain enough for a few subdivisions of the conglomeration, such as the means of reducing prejudice, it becomes more and more evident that the final issue, viz., what, if anything, can be done to turn the operator's loss on white fir into a profit depends on the filling of some very disconcerting gaps in our stock of precise information dealing specifically with logging costs for trees of different diameters and with varying amounts of defect, sawing practice at the mill, remanufacturing methods and losses, and seasoning methods and losses.

These are all in the category of major projects but without the data which such studies would provide, our recommendations must be reduced to the rather unsatisfactory status of mere suggestions.

Compression Wood. An official of a company which produces a large quantity of sugar pine called at the office with a sample of piano key stock from a portion of a shipment rejected by an eastern buyer. The cause of rejection was compression wood. The company wishes to segregate the faulty pieces in the mill, preferably by sawing those portions of logs which have compression rings into dimensions which will automatically bring about their segregation into the lower grades on the green chain. If the head sawyer cannot detect compression wood readily in the log, the segregation will probably be made at the time of loading on cars. Thus the sawmills are beginning to move toward the ideals so eloquently expounded by Leopold and formerly held by the industry to be will-o-the-wisps.

California Economic Research Council. At the meetings of the Natural Resources Committee and of the Executive Committee of the Council progress was made in plans for furthering research along two lines, Pacific Ocean temperatures as affecting the climate of California, and a land use survey of California. The latter is not yet concrete enough to report, but aims to build up cooperative interest to unite all agencies with the Experiment Station when the time comes.

Heptane. The California Chemical Corporation threw up its cuppage contract on the Lassen because they could get no assurance from the Ethyl Gasoline Corporation as to taking heptane in 1928. The Ethyl people have now emerged from very interesting technical difficulties which now appear to have been responsible for their delay and have executed a new contract with the California company. A meeting with the District Forest Management office is set for April 2, in which Hill will participate, for the discussion of a new cuppage contract. This will mean that the Station experimental work should be continued if any possible way can be found to finance it, and that the report on last season's work and a plan for continuance should be completed at once.

Lumber Census. Out of 490 schedules sent out, something over 300 have been returned to date. A forecast of the 1927 cut on the basis of the cut of identical mills comprising 48 per cent of the pine region cut and 44 per cent of the redwood (for 1926) shows an estimated decrease in total cut for 1927 of 5.6 per cent as against 1926, which would mean a cut for 1927 of about 2,064,783 M feet. This estimate checks very closely with that of the lumber association in the pine region, but is about 12 per cent over that of the redwood association for their region.

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PACIFIC NORTHWEST FOREST EXPERIMENT STATION

March has been filled to more than overflowing with both the working up of last season's data and preparations for the coming field work. Toward the end of the month three of the office started their first field work of the season in order to get done work which must be completed before growth commences.

Writing up the report of the Investigative Committee which closed its sessions March 1, and preparing a digest of this report for circulation to the field officers and others occupied much time.

In view of the fact that the making of phenological observations is to be in effect at least one station on each of the west side Forests, as well as being done by several cooperators, the tentative instructions in use last year were revised and mimeographed. We are expecting in this way to build up a valuable record as to the biotic events of our trees, shrubs, and important lesser plants. There will also be instituted this year a system of conecrop reporting for the important species throughout the National Forests both east and west of the Cascades, for which the Experiment Station will be responsible and for which it has drawn up a form.

The construction of a road near the Wind River Branch Station leading out into a forest of snags gives an unusual opportunity for experimenting with various methods of snag falling, and after several conferences with officers in Fire Control and the Columbia Forest a working plan has been prepared by Munger for the conduct of this snag falling study.

In view of the delay in publishing the report of the Douglas fir yield study, McArdle has prepared a popular digest of this bulletin containing the essential tables which will be published in the annual number of "The West Coast Lumberman," and reprints distributed that the results of this study may be immediately available.

After conference with those in Forest Management, Mr. Westveld has revised the working plan for his study of methods of cutting western yellow pine. The principal change is giving more attention to the major stand and less to the reproduction, but in the main the technic will be the same as that followed last year. Great difficulty is expected this year, however, in finding areas suitable for permanent plots which are to be cut in the near future in National Forest timber sales.

On March 26 Munger, Westveld, and Simson went to Wind River, the first two principally to do the necessary spring work in the arboretum and arboretum nursery. This was completed in spite of incessant cold rains which have been general over the region for a month. From Wind River Munger and Westveld went to Bend and established there a nine-acre plantation, on absolutely denuded logged-off land fronting on The Dalles-California Highway, of an experimental lot of pedigreed western yellow pine. Nine regional races were represented in this plantation. A similar set of trees is by cooperative arrangement being planted on the school forests at Oregon State College, Washington State College, and the University of Washington, and a duplicate of the Deschutes plantation of 9000 trees on both the Columbia and Whitman National Forests.

One of the chief lessons from the study of the application of normal yield tables is the importance of knowing the stand before predictions are made. The final piece of field work, mentioned several times previously in these reports, consisted in making an actual survey of an extensive area of second-growth Douglas fir. The area was a difficult one, having a great mixture of age classes and sites. Within its boundaries is an area of 4190 acres, of which 2631 acres are in second-growth Douglas fir type, 733 acres are taken up by hardwoods and the Sauk River, and the rest is occupied by mature forest and by "other conifers" type. In the 2631 acres the age classes, omitting a small area of 10-year age, range from 60 years to 130 years, with 1031 acres, or 39 per cent, in the 100-year class and 648 acres, or 25 per cent, in the 120-year class. Mixed age classes occupy about 96 acres. The site class ranges from a very good site quality II, in patches practically site I, to a poor site V. Site II covers 53 per cent of the area, site III 28 per cent, and sites IV and V, 9 to 10 per cent each. Site IV contains only 4 per cent of the total board-foot volume, and site V only 1.6 per cent. The average degree of stocking for the whole 2631 acres is about 64 per cent. A predicted volume thirty years hence of 164,559,000 board feet Scribner rule was made. Compare this to the present volume of 131,645,000 board feet. Deduction of 15 per cent for incomplete utilization and the amount is reduced to 139,875,000 board feet. To one merely passing through the area it may seem to be all one site and age, and he would be inclined to lump it all together. But it takes an actual survey to find out the truth. Too much emphasis, therefore, cannot be placed on knowing the stand. Without that yield tables are useless.

During the month spent entirely in the office Isaac completed the progress reports on "Grazing and Reproduction on Douglas fir Logged-off Lands," and "The Survival of Douglas fir Seed Trees." The report on seed tree survival covers two sample plots with a total area of approximately 75 acres upon which an average of two seed trees to

the acre was left. Both areas showed survival of 96 per cent when the falling and skidding operation was completed. The burning of the slash on Plot 1 reduced its survival to 92 per cent. This area presented a high windfall hazard and during the two and one-half years since cutting a windfall loss of 29 per cent was sustained, reducing the survival to 63 per cent. Plot 2, which presented a low windfall hazard and upon which no slash was burned, showed a 94 per cent survival of seed trees two and one-half years after cutting. The third season following cutting there was a good seed crop on the seed trees of both areas while there was but a light crop on adjoining green timber.

Following the tabulation, coding, and mapping of the lightning storm reports, Simson prepared a map of the lightning storm frequency by townships for the National Forests of D-6. Colored dots were used to denote the various frequency classes. The map brings out the marked zoning of the lightning storms in this region. It will later be very useful in a study of the relation of lightning storms to lightning fires.

Simson spent the last week of March at Wind River putting the weather station into operation and helping with the spring arboretum work, returning to Portland April 2. His annual hegira to the Station is delayed this year until mid-April.

Those who have occasion to use humidity instruments may be interested to know that during the season of 1927 a Green No. 116a wet-dry bulb psychrometer was used at Wind River in addition to the whirling psychrometer. One hundred and nine (109) comparative readings of the two instruments showed the stationary psychrometer averaged a little over 2 per cent relative humidity higher than the whirling type. (Probable error $\pm$ 2.7). A number of operators in the Douglas fir region are using the stationary type in preference to the sling psychrometer because of the excessive breakage in the latter type and the errors from careless reading.

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NORTHERN ROCKY MOUNTAIN FOREST EXPERIMENT STATION

During March the friendly suit of the Federal Government vs. the State of Idaho reached the decree stage, whereby 2,098 acres of land have been added to the Priest River Demonstration Forest. The total area is now 6,523 acres, and includes two contiguous drainage units, Benton Creek and Canyon Creek, the former containing about four sections,

and the latter nearly five sections. The remainder is largely river bottom land of high value for certain special purposes. The addition will necessitate making a topographic and boundary survey, as well as an intensive timber cruise of the area, before detailed management of it can be planned.

At the request of the University of Michigan a poster exhibit was prepared, with the assistance of the Office of Drafting, to illustrate a few phases of forest research and the applicability of research results. This exhibit has been loaned to the School of Forestry and Conservation and upon return will be used for local PR work, as well as being reproduced photographically for publication in some of the lumber trade journals.

The new "Fire Behavior Sample Plot" form for recording data on intensively observed fires has been received, and a supply is being sent to the Pacific Northwest and the California Stations for their use. Other Stations interested in the possibility of studying going fires by use of the sample-plot method may obtain a limited number of the new forms by application to the Northern Rocky Mountain Station. The sheet measures 10½x12 inches and provides for consistent records concerning the timber type, underbrush, weeds, ground surface, dead and down wood, duff, overhead fuels, transmission of the ignition temperature, atmospheric factors, behavior of the fire, effects of the fire, and the effects of topography. As this is one of the first attempts to collect on one form all the data pertaining to fire behavior, it is probable that changes and improvements will be made with added experience.

One interesting test of seed storage has now progressed to the stage of preliminary results. Between 1910 and 1919, twenty-five different samples of seeds were sealed in airtight bottles and kept at the Priest River Branch Station to determine how long they might remain viable under such conditions. As mentioned in last month's report, early in March germination tests to determine the present viability of these seeds were started by Marshall. A month in the seed beds has shown no germination among the western white pine, Douglas fir, larch, western red cedar, western hemlock, white fir, lowland white fir, alpine fir, and Engelmann spruce. Two samples of western yellow pine, however, have come through in fine shape. Already 29.2 per cent of the seed collected on the Bitterroot in the autumn of 1912 have germinated. The 1915 test of this seed gave a germination of 32.7 per cent. Another sample of yellow pine seed collected in 1915 now shows a germination per cent of only 8, although when first collected its viability had been about the same as the other sample. Some lodgepole seed gathered on the Beartooth in 1910 already shows a germination per cent of 5.2. All these figures probably will be increased before the test is completed.

Marshall, and Swan of the Office of Public Relations, spent an afternoon up the Bitterroot Valley, photographing and taking measurements on a western yellow pine which had been completely girdled 35 years ago, and is still living. It was apparent that sustenance must have been supplied to the girdled tree by root grafting with a neighboring pine, just seven feet away. (It is suggested to the station that it look up the literature to determine the effect of girdling in increasing diameter growth, the concentration of food materials, and the means of sustaining life through a girdle. The root graft statement is open to question as the reason. E.N.M.) The girdled tree had grown 3.80 inches in diameter above the girdle since cutting, and 0.94 inches below. These figures were respectively 35 and 8 per cent of the pre-girdle growth rates. A short article for publication is being prepared on this interesting phenomenon.

A set of instructions and forms for phenological observations in the northern Rocky Mountain region has been prepared and has been submitted to local interested men for comments. It is planned to get the project under way promptly, with about twelve to fifteen selected observers in various parts of Montana and northern Idaho.

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SOUTHWESTERN FOREST EXPERIMENT STATION

During the month Krauch and Lexen continued with the compilation of sample plot data. Krauch also prepared the first draft of an article dealing with the relation of age and crown class to the height of trees.

Pearson is still in Washington where he is engaged mainly in reviewing manuscripts for publication. He expects to return to Flagstaff early in May.

Our clerk, Mrs. Eva Fleming, resigned on March 1. The position has been filled by Miss Florence Hill who comes to us by transfer from the District Office at Albuquerque.

We have recently received Volume II of "Climatic Cycles and Tree Growth" by A. E. Douglas, Director of Steward Observatory, University of Arizona. Of special interest to men engaged in growth studies should be the chapter on Instruments and Technique. Dr. Douglas has devised some ingenious instruments for measuring and recording growth rings.

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ROCKY MOUNTAIN FOREST EXPERIMENT STATION

March Activities

Roeser spent the first three days of the month at the Fremont Station, during which time most of the cutting and thinning work was accomplished on the one-acre spruce-Douglas fir demonstration plot laid out in the fall. Some time was also spent on the water requirement test of coniferous seedlings in the greenhouse.

The greater part of the rest of the month was employed in summarizing various meteorological data which have accumulated since 1921 in the second phase of the type study experiment involving 14 Fremont field stations in a valley transect. Five south slope and nine north slope stations are concerned. One of each of these groups is located near the apex of a ridge, while two of the north slope stations represent gulch bottom conditions.

From 1921 to 1924 data were obtained under the original stand of western yellow pine, Engelmann spruce and Douglas fir at the different stations. In June 1924 the south slope was partly cleared in the vicinity of the observation line, and in May 1925 it was completely cleared. The north slope stations were also completely exposed in June 1926, the object being to study by process of elimination the effect of the different types in influencing meteorological conditions at the surface of the ground.

Evaporation at the surface of the ground on the south slope prior to clearing was approximately 70% of that at the control station, and on the north slope 35%. During this period evaporation was heaviest in June on the north slope, followed by July and September, while on the south slope June and September were equally high. Since final clearing on either slope, the available data indicate that evaporation has increased about 6% only on the south exposure, while on the north the gain has been fully 84%, indicating the effectiveness of the stand in protecting the ground on the latter site.

Prior to clearing, the average wind movement one foot above the ground for a two-year period was about 51% of that of the control station on the south slope and 29% on the north slope.

On the south slope the effect of clearing has been to increase the mean annual one-foot soil temperatures 1.6% and the mean growing season temperature 3.5%. Similar data have not been computed for north slope conditions. The average mean and growing season one-foot temperatures for the three-year period before the first cutting was

44.84 and 57.23 on the south slope, and 37.93 and 50.82 on the north slope, or 84.6 and 88.8% respectively of south slope conditions. On the latter site four decades only averaged below 32° F. during the year, while on the former all of the period between December 1 and April 20 was below freezing.

At the close of the month the measurements made in 1920, 1923, and 1926 on the six thinning plots in Jack Pine plantations on the Nebraska Forest were compiled. As soon as the results can be worked up the information will be furnished the Supervisor to guide him in future planting of this species in the sand hills.

All previous precipitation records for March were badly smashed at Fremont during the last month. Over 48" of snow fell and the total precipitation amounted to 4.65". Normal for the month has been 1.38". Outdoor activities at the Station were badly interrupted as a result.

April Plans

Office work on the Jack Pine thinning study will be completed in the early part of April. On the twelfth Roeser plans to move up to Fremont and start the season's field work as soon as possible thereafter. It is expected that planting and seed study activities in connection with the lodgepole pine, Douglas fir, and western yellow pine seed source experiments and work necessary to put the meteorological observation phase of the type study underway for the season will take up the rest of the time left in April.

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Rate of Growth of Douglas Fir Forests. (To West Coast Lumberman)

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Central States

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Lake States

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OFFICE OF FOREST PRODUCTS - District One

Sawmill Studies

Some rather interesting facts concerning profitable size limits of defective logs were brought out in Mr. Bradner's discussion at a joint meeting of the Missoula Hoo-Hoo Club and the Rocky Mountain Section of the Society of American Foresters on February 27. All in all, it has been found that defective logs under nine inches in white pine and under twelve inches in yellow pine are ordinarily taken out at a loss.

The following are indicated as the lower limits of merchantability (with no charge for stumpage, interest, or risk).

Western White Pine

9-inch logs	20% defective
13-inch logs	25% "
14-inch butt logs	36% "
20-inch (1, 2, or 3 grade)	41%-50%"
Large butt or middle (Select) logs	60% "

Western Yellow Pine

12-inch logs	10% defective
15-inch (shop) logs	20% "
18-inch (common) logs	20% "
17-inch (select) logs	31%-40% defective
22-inch	41-50% "
27-inch (butt or middle)	51-60% "
Few large select logs	over 60% "

Comparisons were made strictly upon a cost-versus-value (per M feet log scale) basis, no consideration being given to the position of the log in reference to the skid trail, chute, or landing, or to any other factor which might influence the cost of logging, outside of size and per cent of defect.

Among logs of the same top diameter, log position in tree and grade, the kind and location of the defect are important factors in determining the profitable defective limit.

Woods Waste Study

Mr. Anderson recently returned from a two weeks trip in connection with this study. At present it is planned to concentrate on the actual quantitative survey of material left on the ground in both private and Forest Service logging operations. Using information from this work as a base, a number of specific waste problems will be studied.

The white pine match block industry presents a very interesting problem in waste of a very valuable species. One operator in this region reports the present run of match plank as averaging 30% waste material, or that 70% of the plank reaches the match block stage. Five per cent of the waste results from saw kerf, while 25% is cull material unfit for matches. This is sold on the local market as fuel wood at $5.50 per cord. It is reported that occasional runs of match plank yield as low as 55% of match blocks or suffer a loss of 45% in waste material.

A rather interesting situation was encountered in one of the cedar pole yards in the Spokane region. The operator had just finished trimming four hundred 55-foot poles back to 45-foot poles, resulting in considerable waste both quantitative and financial; no doubt a direct result of present market conditions. Recent statistics disclose that 45% of the yardstock investment of the cedar pole industry is in long poles contrasted to only a 7% demand for poles over 45 feet in length. Furthermore, based on the rate of production for the past five years, existing stocks of long cedar poles will supply the demand for 26 years. Very interesting figures, even if only partially true.

Manufacturing and Logging Costs

Mr. Bradner left on March 25 for a field trip in connection with the annual manufacturing and logging cost project. Mr. Neff, of the Office of Management, has been in the field during the past two weeks on the same work. The data will be compiled and distributed during the month of April.

Census

All returns from the first request were tabulated and the second requests were sent to 417 delinquents during the month. A consignment of completed schedules was mailed to the Forester on March 30, for transmittal to the Bureau of the Census. Returns have been received from 55 per cent of the total mailing list for Idaho and Montana.

Lumber Prices

Av. Mill-Run Price	Annual, 1926	Annual 1927	January, 1928	February 1928
Idaho White Pine	$37.77	$35.86	$30.17	$30.78
Pondosa Pine	26.33	25.17	24.19	24.71
D. Fir and Larch	17.78	18.19	16.38	16.68
White Fir	19.10	17.41	16.80	18.01
Spruce	23.73	23.39	25.67	24.86

Miscellaneous

A paper covering "Possibilities of the Utilization of Wood Waste in the Inland Empire" was prepared by Mr. Bradner during the month for presentation at a meeting of the Spokane division of the Society of American Foresters held March 10 at Moscow, Idaho.

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OFFICE OF FOREST PRODUCTS - District Six

District Investigative Report

The section of this report dealing with the research of the office, including proposed projects, was prepared by Gibbons early in the month. Brief reference was made to the Committee's recommendations in last month's report.

A digested section was also prepared for inclusion in the statement that is to be sent to the field.

Air-Seasoning Study

The manuscript "Air-Seasoning of Western Softwood Lumber" by Fullaway, Johnson and Hill, as revised by Mr. Hunn, was received, reviewed by Fullaway, Johnson, (H.M.), and Gibbons and returned to the Forester during the month. The manuscript, as received here, was in very satisfactory shape; the general organization of the report was unquestionably good, and the details hardly without exception were presented clearly. Considering that Mr. Hunn, for one reason or another, pretty well tore the manuscript to pieces, it is rather surprising that more small errors did not creep in; only small errors were picked up by the District men.

The plan is to publish the report as a bulletin, pushing it through the Department to the Public Printer with the greatest possible dispatch.

Little-Used Species Study

The manuscript "Western Hemlock, Its Properties and Their Influence Upon its Use" by Johnson (R.P.A.) and Gibbons was received from the Laboratory toward the close of the month. The plan is for Gibbons to review it, returning it to the Laboratory by the middle of April. This report is to be published as a Government bulletin.

Kiln-drying of Douglas Fir Common

The office received 300 reprints of Mr. Johnson's article "Degrade in Kiln-drying Douglas Fir Common and Finish," based on the degrade study at the plant of the Oregon-American Lumber Company, Vernonia, Oregon. The article appeared in the February issue of The Timberman. The Oregon-American Lumber Company, it is understood, purchased 200 of these reprints for special distribution. So far 179 of these reprints have been distributed.

Mill-Utilization Study

During the month Mr. Johnson completed the tabulation of a considerable part of the log data secured in the yellow pine mill-scale study at the plant of the Mt. Emily Lumber Company, LaGrande, Oregon. The data are being tabulated separately for sound and defective logs, also by diameter and length classes, which is further broken down into "position of log in tree" and "taper" classes. There is still a great deal of work to be done before any definite statement of over-run can be given. However, it seems that the over-run in the small diameter classes will be somewhat higher than that secured in similar yellow pine studies in the Inland Empire.

Preparations are now being made to conduct a more or less similar study at the plant of the Shevlin-Hixon Lumber Company, Bend, Oregon, in the early part of the summer. Logging studies in the yellow pine region will be carried on in conjunction with the mill-scale study. These data will not only enable the tieing-in of the mill-scale study to individual trees, but also will indicate the relative cost of utilizing timber and logs of different sizes, different grades, and different degrees of soundness.

General Wood-waste Survey in the Douglas Fir Region

The work of computing and tabulating the results of the field work in preparation for the report was continued during the month by Mr. Hodgson.

A very interesting relationship was brought out in a set of tables showing the amount of material left in the woods by three classes of operators. The data show that on the average "independent loggers" are leaving 25.3 per cent in volume, based on the original stand of timber; "logger manufacturers" are leaving 18.1 per cent; "loggers who are prepared to utilize hemlock" are leaving 14.5 per cent. The latter class of operators are independent loggers of all species except western hemlock; they have taken care of their hemlock problem to an extent by disposing of their logs of this species to straight hemlock mills or to paper pulp mills operated by themselves or by subsidiary companies.

This wide range of 10.8 per cent in wood losses indicated that the matter of presence and utilization of western hemlock is one of the chief factors to be reckoned with in the study of wood waste in the Douglas fir region.

An effort has been made to isolate other factors from the compiled results of field data, but owing to the involved and interdependent nature of the factors involved it has been difficult to arrive at well-defined conclusions. Mr. Hodgson is now endeavoring to approach the process of isolation by entering facts relating to each sample acre upon a card. These facts include percentage of waste and reasons for Excellent, Very Good, Good, Poor, Very Poor, Bad and Very Bad Utilization (gradations based on 20 per cent, the general average for all companies); when all the acres are carded he believes that by the study and segregation of cards as to reasons and percentages the effect of certain factors can be clearly brought to light.

Felling and Bucking Study in the Douglas Fir Region

The tentative draft of the working plan for this project is practically completed. The plan, as worked out by Spelman, proposes study along lines which will point to improvements in methods, practices and standards of utilization in the felling and bucking of timber in the region. Although statistical data as to what actually happens necessarily must be taken, such information is not an end in itself; it will suggest leads, also emphasize the desirability of practical improvements.

Considerable time-study work is included in the plan of work; it will be used as a basis for determining the cost of falling and bucking trees of different sizes and more particularly to provide a basis for knowing the cost of additional care or improved technique. Study of the mechanical principles involved, the relation of "bed" to breakage in falling timber, and the like, will be gone into intensively; such work may afford the best approach to better methods and practices, and in turn to a reduction in avoidable breakage.

The various wood losses attributed to falling and bucking of timber will be classified and graded as a means to determine economic losses rather than quantitative losses involved, and more particularly the extent of excessive or preventable losses.

Although the working plan is set up in a tentative form outlining certain procedure and field methods, it is believed that the technical methods must be checked in the field before we can be sure of having a satisfactory and practical plan. It is intended therefore that very shortly the form sheets and various methods for assembling the basic data of the study will be given a trial and that necessary revisions will be made before the plan is submitted to the District Forester for approval.

Census

Of the 2016 listed companies, 1400 have so far made some kind of a reply.

A total of 941 edited schedules have been sent to Washington, including 648 in March.

The third request, including 958 companies, and the fourth request, including 717 companies, were mailed out in March. During the month, 390 returns were received.

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FOREST ECONOMICS

Washington

Statistics

A long time has elapsed since this section, consisting of Reynolds, Pierson, and Mrs. Love has been represented in the monthly reports. For that reason it seems well to review the principal activities during the interim.

Taxation Data, Timber Section

At the beginning of January, 1927, we were in the midst of a study of the reports of the Timber Section, Treasury Department, compiling information designed for the use of the Taxation Inquiry, and also to supplement if possible certain of our tables such as the amount of timber and timber land owned by large operators. The work was begun under Mr. R. C. Hall of the Taxation Inquiry. Considerable difficulty was experienced in training the people to understand the Treasury reports, and it was found eventually that only the more experienced field men and one of the Treasury clerks could deliver the goods. Mr. Hall could not be present all the time and left the supervision to Reynolds who spent five days a week at it until near the middle of April. Pierson spent two or three days a week on it, being directly occupied with two other projects. The entire project continued from November, 1926, to April, 1927.

Census Cooperation

Pierson assisted the Census Bureau as usual by examining the lumber schedules received from the West and arranging for their transmission to Mr. Rolle's office.

Lumber Distribution, 1926

The lumber distribution project for 1926 was handled more expeditiously and with greater satisfaction than ever before. We secured reports covering nearly 70 per cent of the entire distribution, a well balanced representation in each important State. Computed foreign distribution differed from the records of Foreign and Domestic Commerce by less than 5 per cent. Pierson was on this project at odd times as the schedule came in and completed the basic compilation and the final tabulations toward the end of June.

Revision of Forest Products Schedule

During the first part of the year consideration was given to the revision of the lumber schedule for the 1927 Census, as urgently requested by the western Districts. Considerable time had been put on this project at previous periods, but final results satisfactory to both this office and the Census Bureau were not attained until late in the year. The success of the revision can not be appraised until the census work of 1927 is completed. It appears, however, that the form is not adapted to small mills as evidenced by requests of five western Districts for additional card forms.

Mississippi Flood Report

In June, following the disastrous floods on the Mississippi, Mr. Sherman requisitioned the services of Reynolds to supervise the office work and computations involved in gathering data from reporting agencies and compiling his report on the Mississippi floods as related to forest lands. For 90 per cent of the time from June to November Reynolds was engaged on this project with practically full time-assistance from L. F. Kellogg, now of the Central States Forest Experiment Station. In addition to the correspondence and supervision of typing and drafting, the reports had to be assembled in books and supplied with suitable photographic illustrations. Mr. Sherman's Service report required several tables which had to be compiled from existing Capper Report and other statistical material.

An essential part of this project was the determination of the areas of all the watersheds in the Mississippi basin, 73 in number, classified by States and by principal basins. This was done by planimetering the areas on U.S.G.S. State maps and converting the square inches to square miles. This job was completed within two weeks and supplied to the reporting stations for use in the basic reports.

Some cooperation was maintained with the Bureau of Soils, the Weather Bureau, and Army Engineers, and considerable masses of information from other Bureaus were examined in order to stay in touch with the ideas developed in other Departments and to gather such items of information as might be suitable for inclusion.

Publication of American Forests and Forest Products

For several years the section has been assembling forest statistics commonly referred to as the "Brain Book." This was finally boiled down into form approved for publication, consisting of 220 tables applying to the United States and to the National Forests, covering sub-

jects such as areas, stand, growth and fire, planting, and forest products. Prominent under the last heading was the development of lumber tables into three series showing United States production, production by individual States, and production by individual kinds of wood. After thorough editing by Hunn in which the section assisted to a considerable degree, the bulletin went to press under the title of Statistical Bulletin No. 21, American Forests and Forest Products, and proof was received very promptly. The proof was read by Reynolds and Pierson, each assisted by a clerk. Some idea of the volume of the material may be given by the fact that it took these two crews two weeks to read the proof. The bulletin was received from the Printing Office near the end of the year, and 8,000 copies were distributed to specially selected lists which included the entire membership of the House of Representatives and the United States Senate, as well as foresters, economists and bankers, libraries, forest schools, and others most liable to be interested. The first edition of 9,000 disappeared so quickly that a reprint was immediately considered.

Maintenance of the Standardized Record Tables

During the last two months of 1927 there became available the lumber bulletin and the pulp wood bulletin of 1926 which permitted Pierson to bring to date as of 1926 all of the "Brain Book" tables. In addition he compiled and computed 15 new tables each showing the production of lumber by kinds of wood, 1899 to 1926, with the mill prices.

Reynolds was absent on sick leave for the last half of December.

Americana Annual

Early in January 1928, Reynolds revised his 4,000-word article on lumber, which had been requested by the editor of the Americana Annual, and two weeks later read the proof.

Lumber Census

Pierson as usual early in the year was occupied for part of his time with lumber census matters. He also revised a short series of tables chosen by the Committee of the Agricultural Yearbook to be included in the 1927 edition. In February suitable revision was made of forest tables to be included in the Statistical Abstract of the Department of Commerce.

Reprint of Statistical Bulletin No. 21

A favorable decision was finally reached between officers of the Service and the Department as to the reprint of Statistical Bulletin No. 21, "American Forests and Forest Products." A number of corrections were secured which had been gathered from various sources, and the lumber distribution tables of 1926 were substituted for thos of 1924 which were printed in the first edition. The proof was received promptly, read and approved in a day and a half.

Estimates of Aggregate Lumber Production by States and Kinds

In the Census lumber bulletin of 1925 appeared an article contributed by this section in which a computation had been made by graphic methods, showing the aggregate lumber cut of the United States from 1801 to 1925. Following that computation considerable work has been done in the effort to split up the national cut in such a manner that tables could be derived showing the cut of each State and the cut of each principal kind of wood comprised in the total of 1,929,000,000 M feet B. M. In order to do this graphic methods were again resorted to, the measurement of such graphs by the planimeter being the means of determining the quantity. This involved considerable assembly of historical data and the opinions of the best qualified men as to the earliest dates when State and species cut began to be prominent. This work has proceeded at odd times for more than a year in the past. During February it was brought to a head, resulting in two tables, one by kinds of wood and one by States, which are intended to be the subject of an article to be published in the cooperative lumber production bulletin of 1927. It may be of interest to note that the aggregate cut of Michigan exceeds that of all other States, and that southern pine is the leading kind of wood comprising nearly 25 per cent of the total. Some slight checking still remains to be done on this project before it is complete.

Revision of Mississippi Flood Report

Late in January Mr. Sherman decided to put his Mississippi flood report, which had previously been in multigraph form, into print as a Departmental publication. For this purpose all figures were checked, and the tables revised somewhat to agree with editorial opinions and criticisms received from readers. Owing to dissatisfaction with certain areas in the Missouri basin, it was decided to put a complete recheck on the area tables, and the planimeter work was repeated, using a method which eliminated the errors arising from expansion and contraction of the paper. Pierson checked, computed and completed the new data. As a result we believe that the area tables which will appear in Mr. Sherman's bulletin are the most accurate areas of watersheds in the Mississippi Basin possessed by any Department.

Computations of Rail Haul and Median Lines of Area

Minor projects which have come up in the latter part of March are the computation of the increase in the rail haul of lumber, 1923 to 1926, which shows an increase in the national average of 25 miles in that period, and the determination of median lines of area in the United States by graphic methods, undertaken for the use of Public Relations. So far as we are able to learn by inquiry no other Department has ever made this determination. The meridian dividing the area of the United States into east and west halves is 90° 5' 28" west longitude. The parallel dividing the area of the United States into north and south halves is 39° 2' north latitude. This work was done on a Lambert "equal areas" projection of the Coast and Geodetic Survey, which advised the use of that map. At their request a copy of the results was transmitted to the Coast and Geodetic Survey.

Study of Economic Factors Affecting Forestry in Wisconsin

For various reasons comparatively little progress has been made on this project during recent months, but Sparhawk is now devoting most of his time to it. This is a new sort of study, altogether different from the Michigan study which preceded it. The object is not to show the need for forestry as a means of utilizing cut-over land or the evil effects of forest destruction. It is rather to analyze the existing situation in order to ascertain just what factors are favorable or unfavorable to the use of land for timber growing, and to suggest measures that will encourage and make possible forestry practice by the various classes of owners. The rapid depletion of virgin timber within the region, the increasing burden of taxes on cut-over land, and the difficulty of disposing of it are arousing forest owners to the need of making some use of their land. The counties and local units are becoming interested because of the problem of tax delinquent lands, which is already serious for some of them.

Some field work was done in Lincoln County in the north central portion of the State during the summer and fall of 1926, and maps have been prepared showing land ownership and the character of forest cover for that county. Although an independent project, some of the work in Lincoln County was done in informal cooperation with Mr. W. A. Hartman, of the Division of Agricultural Economics of the State University, who under the general supervision of Professor Hibbard has been making a study of land utilization and tax delinquency in northern Wisconsin. The cover map has also been used by the Forest Taxation Inquiry in its study of forest taxation in Wisconsin.

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REPORT OF THE FOREST TAXATION INQUIRY

The New Haven office has been chiefly occupied with work on the three Lake States. The first two progress reports have been completed by Fairchild and the first of these has been issued in multigraphed form. Hall is working on a third progress report based on Chapman's office reports covering his study of the resources and tax base of the forest counties in northeastern Minnesota. Herbert has been busy working up data collected by him in Michigan. Murphy is completing the preparation of his digest and abstract of existing forest tax laws.

The tabulations of the data obtained in the cooperative part of the Wisconsin study of sample townships have been completed. Mrs. McGindley is now working with the Hollerith machines at Milwaukee to complete the supplementary tables dealing with appraised values of the different classes of property in the same sample townships.

A compilation of transaction data from the records of the Tax Commission at Madison, Wisconsin, which has just been completed, yields some interesting results. The territory included covers the eighteen northern counties in Wisconsin in which most of the forest area of the state is located. A summary of the results is as follows, the ratios being of total assessed valuations at time of sale to the total considerations:

Kind of Property	Ratio of Assessment to Consideration (Per Cent)	Number of Transactions
Agricultural	71	845
Cutover Forest	102	1,462
Merchantable Forest	46	88
Resort	49	1,056
Village (unincorporated)	53	562

The transactions used for the above table were all of those occurring in 1925 and 1926 which were accepted by the State Tax Commission as sufficiently reliable to be used for equalization purposes, except that about 17 per cent of the total number used by the Tax Commission were rejected because they could not be classified as agricultural, cutover forest, etc., with a reasonable degree of certainty. It is readily apparent that cutover lands are assessed at a much higher proportion of sale value than any other class of property.

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RANGE RESEARCH

Washington Office

Mr. Nelson is rapidly bringing his analysis of the Jornada black grama data to the stage which will allow for its being whipped into final manuscript form. He has hopes of having the manuscript completed during the next month.

Mr. Culley made continued progress on the compilation and analysis of the Santa Rita data.

Appropriation Bill

The Senate Sub-committee of the Agricultural Appropriation Committee restored the increase of $14,245 which the Budget Bureau has approved for the southwestern range research work, but which was eliminated by the House Committee. The Senate followed suit and passed the bill with the range research item as approved by the Budget Bureau and the Committee.

Publications

Mr. Chapline prepared an article entitled "Kidding time on the range" for the Angora Journal.

Two short articles by Mr. Dayton appeared during the month: (1) "Some outstanding forage grasses of western cattle ranges" in The Producer for March, and (2) "What is Agoseris apiculata Greene?" In the Proceedings of the Biological Society of Washington, vol. 41, pp. 17-20, (Mar. 16) 1928, 2 plates.

Range Research Discussed at Inter-Bureau Forest Research Conference

At the Inter-Bureau Forest Research conference held March 9, 1928, Chapline outlined the purpose of range research, the past development, and present organization and the part that the administrative organization of the Forest Service is playing in supplementing the regular research work, collecting information in areas which cannot now otherwise be studied.

E. W. Nelson told of the work at the Great Basin Experiment Station, established in 1912, to study range management problems. He discussed particularly the erosion, climate and plant growth, spring range, and plant vigor studies.

Director Matt J. Culley of the Santa Rita Range Reserve told of the work on this 50,000-acre range which was established in 1903. He brought out especially the necessity of conservative grazing under the widely varying climatic conditions at the Reserve and the results of the studies of climate and plant growth, systems of grazing use, clipping at different intensities and time of use and the handling of stock projects.

Many grazing and forestry relationships were discussed in the general discussion that followed. Also, the close relationship between livestock and wild life use was clearly brought out. Field men generally should be more observant and record more generally their observations of trees and subordinate plants, and the interrelationship between all the factors affecting vegetative cover.

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FORAGE INVESTIGATIONS

Plant Routine During March

744 plants, representing 24 collections, were reported on to the field, with 375 photostatic prints of economic-notes cards. One collection, of 87 plants, was submitted to the Bureau of Plant Industry for identification. Ten preliminary reports, covering 51 plants, were made. 389 plants were mounted for the herbarium. A large volume of plant material was returned from the Bureau of Plant Industry, but, owing to a shortage of stenographic help during the month, a considerable portion of this material will not be reported on until April.

One of the Rarest American Grasses Collected

A tiny desert grass, one of the rarest and least known species of the American flora, Blepharidachne kingii (S.Wats.) Hackel, has been collected by Mr. J. O. Stewart on the Toiyabe National Forest, Nevada. The material has been requested by Doctors Hitchcock and Coville for the U. S. National Herbarium. Probably because of its extreme rarity Mrs. Chase overlooked this species in preparing the grass portion of Mr. Tidestrom's "Flora of Utah and Nevada" (its type locality is Nevada), and Wooton & Standley forgot to include it in their Flora of New Mexico, in which State another station for the species occurs.

Review of Mr. Sudworth's Posthumous Bulletin

At Mr. Marsh's request Dayton made a rather detailed review of Mr. Sudworth's posthumous bulletin on the walnuts, poplars, and willows of the Rocky Mountain region.

Review of Botanical Photographs

On his recent detail to Washington Mr. W. I. Hutchinson requested that Dayton go over the photographs of individual plant species in the Washington office photographic collection, and also of the prints deposited there from the late Mr. Sudworth's collection. This is a rather large order; it has been started, but will have to be done piecemeal, owing to pressure of other duties.

District 4 Common Names List

District 4 has submitted for approval an extensive list of common names for range plants. On a number of these Dayton has had conferences with Dr. Coville, the foremost exponent in the Department of the subject of English plant names. A number of genera have caused trouble; notably Stipa, Chamaenerion, Eriogonum, Geranium, Hedysarum, Ligusticum, Osmorhiza, and Polemonium. We would like particularly to hear from the field regarding a name, acceptable to the entire Department, for one of our commonest plants, Chamaenerion angustifolium, which occurs throughout a large part of the United States, Canada, Europe, and Asia. In the Forest Service this is practically universally called Fireweed; to gardeners this plant is known as Blooming Sally and this name is official in Standardized Plant Names (N.B. "Sally" is a corruption of Romance words for Willow (Salix) and alludes to the willow-like character of the plant, which is also referred to in the English name willow-herb). Dr. Coville feels strongly that the Forest Service name, Fireweed, cannot be generally accepted because Fireweed is well standardized for the familiar composite weed, Erechtites hieracifolia; he suggests Burnweed for Chamaenerion. How does this appeal to the field?

Miss Hayes Makes an Impression

Whatever may be the standing of RG there can be no doubt that at least one member of our organization, Miss Doris W. Hayes (our newly appointed junior plant ecologist), has made a hit with the administration. One morning during the month, while rushing to work

in the face of a typical March gust, Miss Doris ran headlong into a slim gentleman just south of the Treasury Building. As Miss Hayes looked up, and the gentleman in question removed his beaver hat, she realized that she had encountered unofficially the President of the United States.

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District 3

Field work has largely occupied one man's time recording this season's records of the browse range project on the Tonto and Crook Forests in Arizona. We have lived in the field with this project for most of the time during the past three years. An attempt is being made to arrange the work so it can be handled by field trips at stated intervals.

One man's time has been given over to the compilation of the first year's data on timber reproduction plots, a part of the range project in the sawtimber type.

Cooperation

Mr. Hussey of the District Office spent several days in the Roosevelt Dam region assisting us in revegetation and erosion studies by plane table mapping of control plots.

Assistant Supervisor Putch of the Prescott Forest gave us considerable help on the browse studies for a month. We hope we were able to give Putch some lasting impressions to carry back to the Prescott Forest; something of benefit in administering that forest's brush range.

Browse Range Studies

Work on browse range continues to emphasize the tremendous need for improvement of stand. Revegetation of herbaceous plants between and under the shrubs (open crowned ones) is the solution. Not only are herbs necessary for watershed protection but to rebuild soil value and render the range productive. In securing revegetation controlled grazed plots continue to show the great advantage of seasonal use during some period after the maturity of grasses.

Very favorable conditions during late 1927 and early 1928 gave promise of an exceptional spring season. Lack of moisture, warm and windy days during March, have canceled the promise for a good growth of annuals. The desert valleys are dry, growth has amounted to but little. In the higher semi-desert, annuals have not developed into normal-sized plants, not even the species germinating in the fall that have formed good taproots during the winter.

Such seasons as this, that are the rule not the exception, further prove the advantages of perennial herbs, once dominant. Perennial grasses continue to develop while the dwarf growth annual dries up. The better the stand of perennials and the less soil values have been disturbed, the better growth has advanced during the dry period. Many and conclusive are the proofs in the semi-desert that drouthy conditions become more and more apparent with the depletion of herbaceous vegetation and influences of active erosion. Even a short dry period during the growing season reflects drouthy tendency where depletion of cover is allowing rain water and the most productive water-retaining soil to be lost. Areas of good cover have been found to have made normal growth during the past dry month.

Visitors

Mr. Musgreaves, head of the Biological Survey in Arizona, spent March 27 and 28 with us in the field. After seeing considerable of the work on browse range in the field he expressed the opinion that the trip had been an eye opener; that the project was of extreme worth to the stockmen and to the state of Arizona.

A field party headed by Mr. Kearney from the B.P.I. Experiment Station at Sacaton, Arizona, spent the afternoon of March 31 with us at Roosevelt. They added several new plants to their collection from our back yard.

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District 6

Meeting of the District 6 Investigative Committee, February 28 and 29, followed by preparation of the Range Research section of the Committee's report to the Forester and digest of the report for field consumption, with numerous other odds and ends occupied considerable time during March. This seriously interrupted analysis of the 3 years' plant succession data in the study "Grazing Management of Douglas fir Cutover Lands." Every effort is being made to complete this analysis and the report before the opening of the field season.

Herbarium

Little time was left for plant work, leaving much still to do on this important continuing project. Fifty species photos were selected, labeled and filed in the herbarium notes (card record). The addition of these species photos to the record, many of them taken in situ, is proving a valuable addition to this plant reference. Duplicate photos are likewise attached to the specimens themselves. As additional plants are photographed these are being added.

Correction of Data in February Report

In the rush attending the meeting of the Investigative Committee and preparation of the RG section of the report to the Forester two errors were made in the percentage figures given in the plant successional study on Douglas fir cutover area, briefly summarized in the February report to the Branch of Research. The decline in the density of all vegetation on grazed plots was 33.9% in place of 39.9%, a typographical error.

The statement that the grass and sedge group increased 48.7% on protected plots was, however, an atrocious blunder for which no excuse but apology is here offered. The facts are that "the grass and sedge group" decreased 2% on protected, and increased 15.6% on grazed plots.

This analysis bears out earlier observations that grazing use of Douglas fir cutover areas promotes the spread of grass species, a significant fact when it is realized that this type of vegetation is less inflammable than fireweed which grazing helps to eliminate. This also prolongs the grazing cycle of use and provides means for future protection.

Lest those who read this gather the impression that the major purpose of this experiment is the development of more sheep range it should hastily be added that careful check of the effect of grazing (loss and damage) on coniferous reproduction is also being made periodically in cooperation with the Northwest Experiment Station, whose personnel are now preparing an analysis of the season's data - this feature as part of their magnum opus "Natural Regeneration of Douglas fir."

Decline of Unpalatable Shrubs on Protected Areas

Another feature which analysis of this study of plant succession brings out is the response of 5 strictly unpalatable perennial species, 3 of them shrubs, under grazed and protected conditions, as shown in the average density figures for the transect in 1925 and again in 1927 after two seasons heavy grazing use.

	Protected Plots			Grazed Plots		
	1925	1927	% Increase or Decrease	1925	1927	% Increase or Decrease
Bracken	6.76	4.12	- 39.	9.29	8.42	- 9.5
Salal	.77	.70	- 9.	.49	.58	+ 9.
Ceanothus		.06	+ 100.	.008	.04	+ 400.
Oregon grape	1.03	.67	- 35.	1.05	.88	- 16.
Dogbane	.99	.22	- 78.	.84	.38	- 55.

The significant feature here is the fact that with all five species greater decrease or less increase occurred to date on protected plots than on grazed. While one other species (annual senecio) and the grass - sedge group already mentioned fall under this same classification (although for other reasons), the remaining 17 species found on the area show the influence of the two years heavy grazing use by greater decline on grazed than under protected conditions.

Since these 5 species are of the non-palatable perennial class, rarely touched by stock, except when heavily grazed conditions prevail, it bears out the theory that grazing through removal of its competitors and through soil disturbance and packing has to date been a beneficial agency in the growth and development of these 5 nonpalatable species. The same principle may be applicable to Douglas fir coniferous seedlings in the Northwest and perhaps explains the excessive yellow pine reproduction frequently noted on old sheep driveways on the Fremont, Umatilla and other Blue Mountain forests.

This is no plea for overgrazing as a means of aiding forest regeneration. It merely emphasizes the importance of careful successional study of the lesser vegetation as a possible guide to the solution of certain phases of the knotty reproduction problem.

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Great Basin Experiment Station
January, February and March

General

All available time during the winter has been spent on preliminary compilation of field data. During December and January Nelson prepared memorandum progress reports on the climate and plant growth and period study projects. He left on January 30 for a three months detail to Washington to carry forward the preparation of a report on the revegetation of black grama grass in the Southwest. District 4 has assisted materially by the assignment to the Station of Assistant Compiler H. H. Van Winkle for the period from December 5 to March 15. Practically all of the quadrat and major plot data have been computed and summarized.

Meetings

Various stockgrower's conventions in the Intermountain region have been attended by the Director during the winter. The Idaho Woolgrower's Annual Meeting was held in Pocatello, Idaho, on January 15, 16 and 17; the Utah Woolgrowers met in Ogden on January 18 and the National Wool-grower's Convention was held in Ogden on January 19, 20 and 21. The Utah State Farm Bureau convened in Ogden on January 22, 23, and 24. The Lincoln County Woolgrowers held their annual meeting in Cokeville, Wyoming, on March 16 and 17. Each of these meetings indicated an increased interest, on the part of stockmen, in better range management and in the value of research in finding the solution of the many problems involved. For several years the grazing fee controversy has been in the limelight to an extent that range management questions have been pushed into the background or left out of the picture entirely. This year there was but little reference to fees and the meetings devoted their time to more constructive matters.

Talks

Talks have been given during the winter before the Provo Conservation Association, the Kiwanis Club of Ogden and the Lincoln County Woolgrowers. The first two dealt with the broader phases of conservation and use of the renewable resources in the Intermountain region and the value of research in solving the many problems that are involved. Methods of increasing production of forage on range lands both by artificial reseeding and by range management to obtain natural revegetation were discussed before the Lincoln County Woolgrowers.

Investigative Committee Meeting

The District Investigative Committee meeting was held on February 27, 28 and 29. In addition to representatives from the District Office and the Station, this meeting was attended by two Forest Supervisors, one Assistant Supervisor, W. A. Denecke of the U. S. Sheep Experiment Station, the President and Secretary of the Utah Woolgrowers' Association and State Senator W. D. Candland. A number of other stockmen expressed their regrets for not being able to attend the meeting because of other engagements. An encouraging feature of the meeting was the interest of the stockmen who attended in the Station work and their approval of the organization of an advisory council to take part in planning range research work. It is hoped that the council may be formally organized during the year.

A considerable part of the time of the meeting was devoted to the discussion of the administrative investigative projects in range management, forest management, and forest wild life being carried on in District 4. The absence of a forest research organization and the comparatively limited amount of range research being done in the region occupied by District 4 has stimulated administrative investigations. These projects are designed to provide information on problems that research has not been able to attack and to work out the details for the local application of principles already developed by research. The work is all being done by the field force with technical direction and assistance from the Supervisors and District officers. Among the benefits incidentally being derived is the training it gives the men in the field in the closer observation and study of forest problems on the ground and the appreciation of research that it teaches.

Fairly extensive game studies are being carried on on the Kaibab Forest with deer. These include feeding habits of deer, damage to forest reproduction, diseases and methods of trapping and handling the animals for distribution. The deer grazing studies are being handled largely by Ranger E. V. Storm, who was assigned to the Great Basin Station for two years and who for 5 years handled most of the field work for the Station in the study of the use of browse range by cattle in southwestern Utah. This study and the deer grazing study are very similar except that different species of animals and of plants are involved.

Effect of Vegetation on the Water Supply

Now comes the "other side" of this watershed protection business. The Ephraim canyon watershed, on which the Station and the effect-of-grazing-on-watersheds project are located, an area of approximately 15,000 acres, furnishes the irrigation water supply for several thousand

acres of farm land in San Pete Valley. The water users have been contending for some time that the increase in vegetation on this watershed which has occurred under the regulation of grazing by the Forest Service, is decreasing the streamflow. Recently they have petitioned that heavier grazing be practiced in order to thin out the vegetation, pack the soil and form trails down which the water will run to increase the surface runoff. Prior to the eighties, it is claimed, not enough water came down the streams to irrigate more than a few small farms. Heavy overgrazing that seriously denuded the watersheds took place in the late eighties and the nineties and summer floods were frequent. The runoff from melting snow, it is contended, became greater and more land was placed under irrigation, but now the streamflow has decreased until there is a serious water shortage. The argument is made that the additional vegetation utilizes more moisture and it is not available to runoff.

Unfortunately there is no gauge on the stream in question and the contentions are based primarily on human memory and supposition. The results of studies by the Station indicate that the increase in grasses and weeds to date have had no influence one way or the other on the surface runoff from melting snow which furnishes about 95 per cent or more of the surface runoff. Rainfall which furnishes about 5 per cent or less of the surface runoff has been materially reduced by the increase in vegetation. Other factors such as the amount of snowfall and temperature conditions during melting, vary so greatly as to overshadow the effect of the increase in vegetation on watersheds. The allegation regarding the effect of vegetation on runoff is going to afford the Station the opportunity of applying its results right at home.

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JORNADA RANGE RESERVE

Range Conditions and Precipitation

Although no rain fell during the month, there was sufficient moisture in the soil to start grasses and weeds. As a result, cattle were in much better condition at the close than at the beginning of the month. Growth will soon be arrested, however, if additional precipitation does not come. The continual March winds are evaporating the available soil moisture with considerable rapidity.

Improvements

The new Bull Pasture was completed. This is one of the most desirable arrangements made possible by the new cooperative agreement. After this winter, the bulls will be kept during December to June on the best grama range on the Jornada, which will insure their going into the breeding season in good condition.

Investigative Work

The month has been largely devoted to routine compilation work.

Visitors

Director James T. Jardine, of the Oregon Agricultural Experiment Stations, visited the Station on February 26. He was accompanied by Mrs. Jardine, and by Mr. and Mrs. Emmet Isaacks of Las Cruces.

J. D. Jones, Assistant District Forester, spent two days, March 14 and 15, in Las Cruces. He gave a talk "Forestry as a profession" at the Las Cruces High School. He also delivered an address on erosion before the Western Divisional Farm Bureau Conference. Forest Service pictures were shown at the local theater during his stay.

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SANTA RITA RANGE RESERVE

Growth and Precipitation

During the first part of February we received considerable rain and snow with a total of 3.26 inches of precipitation at Headquarters and as a result growth has been very good, however continued dry weather and high winds since the first of March have caused the soil to dry out very rapidly. This total of 3.26 inches of precipitation for February is the highest amount received during that month at the Reserve Headquarters over a period of twenty-eight years, with the exception of 1904, which was an unusually wet year all the way through. It is two inches above the average for the month calculated from the preceding twenty-seven years' records. On the other hand, the precipitation for January was approximately one and one-quarter inches below the average for that month and only three years out of the preceding twenty-seven for which we have records show as little rainfall during the month.

Also, the month just closed (March) was one and one-quarter inches below average, total amount received being zero, and only one year of the preceding twenty-seven shows as little moisture for March. The total for the three months is one-half inch below the average total. The records show that it is very unusual for the major portion of the total rainfall for these three months to come in February and just what effect this peculiar distribution of moisture may have upon the spring growth remains to be seen. It is possible that it will have no effect at all and there is none observable so far. Alfilaria and Indian Wheat have made an excellent growth and the perennial grasses have done fairly well.

Stock

Cattle are getting considerable green feed and are in excellent condition over the entire Reserve. An unusual number of early calves are making their appearance and the Cooperators are very optimistic about the prospects for the coming season. Ruelas has just purchased a small herd of registered cows from Phoenix breeders. Parker has recently bought eleven head of registered bulls from breeders at Amarillo, Texas, and expects to receive about twenty head more from the same district within the next week or two.

Miscellaneous

The building housing the post office at Continental was destroyed by fire on February 6 and all of our mail for several days went up in the smoke. The most exasperating part of the episode was that the monthly pay check for the Station's Mexican laborer was destroyed, with the consequent fun of securing a duplicate check.

Several days in March were spent in dodging from regular work to overhaul the Station Ford which was literally past going. It is very fortunate that the Station is placed on a hill for otherwise "Henry" would never be started on a chilly morning.

Dr. Walter P. Taylor of the Biological Survey spent February 24 and 25 on the Reserve working on his studies of the kangaroo rat. Prof. W. G. McGinnies, Grazing Range Specialist, University of Arizona, and Mr. Gorm Loftfield were working on the Reserve from March 20 to 23, inclusive, mapping the vegetation on one of the University experimental areas using the plane table and telescopic alidade method. This method appeared very satisfactory in the field and should yield some very interesting results. Dr. Voorhies and Dr. Howe of the University were out March 23 looking for specimens of the pink bollworm in the wild cotton which is common around Headquarters. Mr. and Mrs. Edw. H. Graham

of the Carnegie Museum of Pittsburgh, Pa., were camped at Headquarters from March 23 to 26 while making a collection of plants and insects for the Museum. On March 31 Mr. Graham returned to the Reserve with Dr. Petersen, a botanist and geologist of Denmark, and the day was spent with them in going over some of the material in the Station herbarium and in a short field trip.

For the past 6 years every possible effort has been made to compile all the Santa Rita investigative data on standard letter size sheets or forms, and now comes the word from Mr. Culley that the Branch of Computing in the Washington office insists that all their compilation work be done in this manner for reasons which are obvious: (1) It makes for convenience in filing (2) all compilation on each project can be bound together and made readily accessible for future reference (3) it makes it possible to study data at an ordinary sized desk and (4) data compiled in this way is easily carried in a manuscript case, thus eliminating the use of unwieldy tubes or packages in traveling.

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What is Style?

"What is style?" may be answered in one word or in many words. A one-word answer is "individuality." Some will prefer another one-word definition: "Personality." My own preference would be for a ten-word definition as follows: "Adequate expression in language of a consistently individual mental attitude."

Let us see how this definition works. If you have no individual mental attitude, you have no style. If your attitude of mind, though largely individual, is not consistently so, but clothes itself frequently in borrowed garments, you have no style. If your attitude of mind, however individual and consistent, can not be expressed in language, you have no style. It is not desirable to split hairs over a definition of this sort, and any effort to define style would be of little advantage were it not apparent, that some of us, through a somewhat mistaken notion of what constitutes style, are in danger of rushing to the defense of something which does not exist.

"Why is it that every effort to develop individuality in writing is apparently discouraged by the editors?" The answer is, because we are conducting a research unit and not a school. In school the preliminary efforts are carefully studied by the instructors, the good points are praised and dwelt upon and developed; all the unsuccessful first efforts are thrown away after they have served their purpose of instruction, and only the final achievement is preserved as an example of the pupil's best work. In a research unit, where every report that is technically correct and valuable must be published, this is not possible. The demand is that all the literary output must be brought up to a certain standard. It will be freely admitted that this standardizing of the published reports generally results in utter flatness so far as any question of style is concerned. The admission can, however, be made unblushingly since no one has yet been able to offer any practicable suggestions looking toward a better way of attaining the desired, if not entirely desirable results.

"Is it possible for a research worker to develop individuality in his writing in spite of the present system of editing of manuscripts?" It is; but it is very difficult unless he is already equipped with adequate schooling in this particular. If he does not have this schooling, or has failed to take advantage of the schooling opportunities which he has had, he may as well admit to himself that he is up against it, and conform as gracefully as possible to the requirements of the situation. If what the editors do to his manuscripts never teaches him very

much about the development of style, it will at least gradually show him some of the things which he should avoid and may by the elimination of some of these obstacles in his path help him to become a good artisan if not an artist in putting thoughts into language. Even this much will be a great improvement over the case of the man who can express neither himself nor his ideas straightforwardly and adequately.

"You say I have no style; but could you not recognize a page of one of my manuscripts among pages written by other persons?" If I happen to know your work fairly well I might be able to pick out a page of it among others. A parable may help to show why this recognition of a person's characteristics of writing does not constitute an admission that a person has a fully developed style. Suppose that a convulsion of nature raises slightly above the surface of the sea some large and very elaborate structure that has lain for a long time on the ocean bed and is untirely entirely unknown to the people living on the nearby shores. The knobs and bumps and protrusions which appear above the surface have a consistency with the whole structure which can not be appreciated from the shore. They seem merely to mar the surface of the sea, to be inconsistent and unnecessary, and better removed. It will take a much greater convulsion of nature or a much deeper penetration on the part of the observer to substantiate the claim that these protrusions really represent a part of the whole structure. In the somewhat convulsive efforts to write a report the research worker manages to get into written expression some characteristics of his consistent and individual mental attitude. He feels that he has achieved a style of his own and when he later on finds many of these characteristic expressions flattened down or hacked away he is inexpressibly wounded. He does not understand why editors should so strenuously oppose all his efforts to express himself in his writings. He does not see that what he has projected into the plane of written expression is only a lot of apparently unrelated fragments of his mental attitude and that however consistently they may be related to all that he has failed to express, they do not necessarily constitute a valuable contribution to that report.

If the editor were running a school his handling of the manuscript would be very different from what it now is. The manuscript would be used as a concrete example of good and bad writing and, having served its purpose, would generally be thrown away. Manifestly, under the present pressure of production that is impossible.

"What more is needed on the part of the writer?" The whole answer to this question is so brief and so obvious that few will give it the consideration it deserves. The answer is, "hard work." Except for those few who have unusual ability or who have made the most of the best instruction, all question of style had better be put aside. A far

more satisfactory goal for most of us, and one which we can all attain if we are willing to devote hard work to it, is the ability to explain simply and clearly what we have to say. It should be possible for any one who can read intelligently above the grade of the ordinary newspaper to pick up any but the most technical of our bulletins and circulars and on a single reading get a clear picture of the succession of ideas that have been presented, their relation to each other, their respective importance, and their significance in the general subject of forestry. If in addition the author has managed to give adequate expression in language to a consistently individual mental attitude so much the better, but that is not essential.

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